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FACTORS INFLUENCING THE THERMOCHEMICAL BEHAVIOURS OF TIRE RUBBER: PART I - INFLUENCE OF FIBER AND METAL

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Abstract

In this paper both kinetic and thermodynamic parameters of thermochemical transformation of waste tires are evaluated by using thermogravimetric analysis (TGA). For rubber thermochemical decomposition, individually and in the presence of other tires components, some kinetic and thermodynamic parameters such as energy of activation (E_a), frequency factor (A), reaction enthalpy (ΔH), entropy (ΔS) and free energy (ΔG) have been calculated by using the integration method.

The experimental data was used to highlight the influence of textile and metal tire compounds and provided worthy and substantive information on the issues to conduct and manage thermochemical process at larger scale in order to maximize the interest product yield.

Kinetic parameters values show that tested materials exhibit different thermal degradation patterns during pyrolysis process at different heating rates. Two distinct areas of weight loss and a shift of thermal degradation peaks at higher temperatures and increasing heating rate have been identified. Also, it was established that both individual fiber and metal induce an important decreasing in E_a and ΔH values during tire rubber pyrolysis.

Key words: kinetic / thermodynamic parameters, pyrolysis, TGA/DTG, waste tire

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